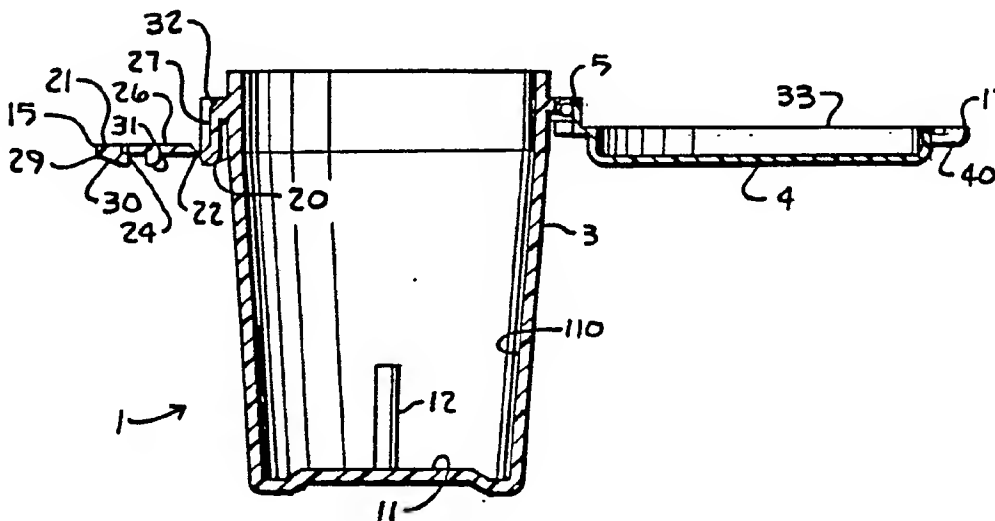


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(54) Title: HINGED CLOSURE FOR CONTAINERS



**(57) Abstract**

A container (1) includes a hinged closure member (4) having a latch (6) for securing the closure member in a closed position. The latch includes 'child resistant' configuration wherein it is very difficult for adolescents to open the container (1) and an 'easy open' configuration wherein it is relatively simple for persons with limited manual dexterity to open the closure member (4). The latch (6) includes a bipositional tongue (21) hingedly attached to either the container or closure member. The tongue (21) is hinged to allow for the various configurations and, when in the child proof configuration, substantially requires use of both hands and a substantial amount of dexterity in order to open the closure member (4). Various devices are further provided to protect the tongue from manipulation by adolescents and for indicating previous tampering with the container. The closure member (4) is connected by a hinge to the container. The hinge includes a bar (53) attached to either the container (1) or the closure member (4) and a semi-circular sleeve (58) which rotates about the bar (53) and that is attached to the opposite of the container (1) or the closure member (4).

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## HINGED CLOSURE FOR CONTAINERS

Background of the Invention

The present invention relates to child resistant closures for containers having medicinals or other dangerous materials therein and, in particular, to such a container having a bipositional latch which allows adults of limited dexterity to easily open the container in one configuration and which provides a substantial amount of resistance to adolescents in opening the container when in the other configuration. Further, a hinge is provided which allows a closure member for the container to be molded separately from the remainder of the container, yet which prevents easy removal of the closure member from the hinge side when the closure member is closed. This allows a separately molded closure member to be easily mated with the container when the closure member is in an open position thereof.

For many years, both governmental and industry standards have been promulgated to attempt to prevent accidental poisoning or injury to children by making it relatively difficult for children to open certain types of containers, for example, pharmacy vials containing drugs. Unfortunately, most of the developments which make containers difficult to open by children also make the containers difficult to open by adults. This is especially true of adults having limited manual dexterity, such as both younger and older adults suffering from arthritis and other diseases or those having injuries which lessen the dexterity of the person.

1           Various prior art devices have been developed which  
2 attempt to provide both a difficult to open container when  
3 the product is being used in the presence of children and an  
4 easy open container for persons having limited dexterity.  
5 One such device of this type is described in applicant's  
6 Patent No. 4,353,483 which included a bipositional hinged  
7 tab which made the lid easy to open when in one position and  
8 relatively difficult to open in another position.

9           Unfortunately, the prior art devices have had somewhat  
10 mixed success with children, since children can be quite  
11 creative in opening containers. This is especially true  
12 where a child is willing to use his or her teeth to attempt  
13 to open the lid of a container. The child is often able to  
14 make up for the loss of manual dexterity or the inability to  
15 understand how to open the lid through the strong pressure  
16 that can be exerted by the teeth and which can pry the lid  
17 open or bite off portions of the latch to allow the lid to  
18 open. Certain prior art devices have attempted to  
19 circumvent the problem of the child using the child's teeth  
20 to open the latch by the positioning of guard members to  
21 keep the child's teeth from engaging the lifting tab (for  
22 example, see the U. S. patent to Stull No. 3,826,394).

23           None of the prior art devices has highly effectively  
24 and inexpensively combined a structure which can be  
25 configured so that it is easy opening for adults and yet  
26 which can be configured so that it is very difficult to open  
27 by children.

28           It is also becoming increasingly evident to product  
29 safety specialists that closure members for certain types of  
30 containers, especially pharmaceutical vials, should be

1 designed such that the lid once attached to the body is  
2 always maintained connected to the body of the container and  
3 preferably such that the lid can be closed using a single  
4 hand. That is, that a user can both swing the lid into a  
5 closed position while holding the vial with the same hand  
6 that is being utilized to swing the lid and that the lid  
7 will then automatically lock in a secured configuration when  
8 the lid is closed. This concept is frequently referred to  
9 as "one hand and one motion to close".

10 It is also desirable that the container include a hinge  
11 for connecting the lid to the body of the container that is  
12 also difficult for a child to manipulate and, thereby, open  
13 the container from the rear thereof. There is also a need  
14 in the industry for the lid to be able to be removed from  
15 the container when in the open configuration thereof such  
16 that the lid can be individually molded from the container.  
17 This allows one standard size lid to be manufactured for  
18 multiple sized containers or vials at a substantial savings  
19 in molding expense.

20 It is still further desirable that such a hinge hold  
21 the lid in at least one predetermined open position such  
22 that the lid will not flop freely back into a closed  
23 position, thereby making manipulation of the vial  
24 difficult.

25 It is also desirable to be able to provide covers or  
26 shields for both the latch and hinge to further prevent  
27 tampering with these structures by children using their  
28 teeth. In addition, the region between the container lid  
29 and body other than at the latch and hinge is preferably  
30 also protected from children prying apart the lid from the

1 body in this region.

2 Finally, it is desirable in some instances to be able  
3 to provide a tamper indicating mechanism on the container  
4 which indicates that the lid has been previously opened.  
5 This is especially true of pharmaceuticals that are sold  
6 over the counter in order to alleviate concerns that the  
7 drugs therein have been poisoned.

8

9 Objects of the Invention

10

11 Therefore, the objects of the present invention are: to  
12 provide a container having a closure member and a latch for  
13 the closure member which is alternatively adjustable to an  
14 easy opening configuration or to a child resistant  
15 configuration; to provide such a latch that, when in the  
16 child resistant configuration thereof, is relatively  
17 inaccessible to a child's teeth; to provide such a latch  
18 wherein the latch mechanism includes a bipositional and  
19 resilient tang or tongue with an outward projecting tooth on  
20 a distal end thereof and with an opposite end thereof  
21 connected to either the container body or the closure member  
22 and with the opposite of the container body or closure  
23 member including a bar behind which the tooth flexibly  
24 passes upon closing of the closure member such that the  
25 tooth is resiliently biased to remain in such position until  
26 manipulated by a person opening the container; to provide  
27 such a latch wherein the person opening the latch must both  
28 push radially against the resiliency of the tongue while  
29 pulling upwardly on the closure member thereby requiring  
30 simultaneous manipulation of at least three different fungei

1 to open the closure member; to provide such a latch wherein  
2 the degree to resistance provided by the latch member to  
3 opening is a function of the support provided directly  
4 behind the tongue in conjunction with the flexibility of the  
5 tongue; to provide such a container having a hinge thereon  
6 which allows rotation of the closure member relative to the  
7 container body when the closure member is in an open  
8 position thereof; to provide such a hinge including a spaced  
9 but generally tangentially extending bar-like structure on a  
10 first of the closure member or container body and with a  
11 semi-circular sleeve member on the opposite of the closure  
12 member or container body such that the semi-circular member  
13 rotates about the bar; to provide such a hinge wherein the  
14 semi-circular member is aligned such that when the closure  
15 member is in the closed position thereof, the semi-circular  
16 member cannot be readily removed from the bar, whereas when  
17 the closure member is in at least one open position thereof,  
18 the semi-circular member can be removed from or placed on  
19 the bar, thereby allowing the container to be manufactured  
20 in two parts; to provide such a container having protective  
21 shields passing over the latch member tongue and over the  
22 hinge semi-circular member so as to limit accessibility of  
23 children's teeth thereto; to provide such a container  
24 wherein a seal is formed between the closure member and  
25 container body between the hinge and latch and wherein the  
26 seal is configured so as to prevent an adolescent from  
27 prying the closure member apart from the container body in  
28 this region; to provide such a container wherein the  
29 container includes a tamper indicating mechanism to indicate  
30 that the container has been previously entered; to provide

1 latch mechanism and a hinge mechanism which is readily  
2 applicable to a wide variety of containers including  
3 pharmacy vials, aerosol cans, blow molded bottles, bottles  
4 with retainer rings and the like; and to provide such a  
5 container which is relatively inexpensive to manufacture,  
6 easy to use and particularly well adapted for the intended  
7 usage thereof.

8 Other objects and advantages of this invention will  
9 become apparent from the following description taken in  
10 conjunction with the accompanying drawings wherein are set  
11 forth, by way of illustration and example, certain  
12 embodiments of this invention.

13 The drawings constitute a part of this specification  
14 and include exemplary embodiments of the present invention  
15 and illustrate various objects and features thereof.  
16

17 Brief Description of the Drawings

18  
19 Fig. 1 is a perspective view of a container having a  
20 container body, a closure member, a latch, and a hinge  
21 connecting the closure member to the container body.

22 Fig. 2 is a fragmentary perspective view of the  
23 container, showing the latch in greater detail and the  
24 closure member in a closed configuration thereof.

25 Fig. 3 is a top plan view of the container showing the  
26 closure member thereof in an open configuration.

27 Fig. 4 is a cross-sectional view of the container  
28 showing the closure member in an open configuration thereof  
29 and showing the latch in an easy open configuration thereof,  
30 taken along line 4-4 of Fig. 3.



1           Fig. 5 is a side elevational view of the container with  
2 portions broken away to show detail thereof, with the  
3 closure member in the closed configuration thereof and with  
4 the latch in the easy open position thereof.

5           Fig. 6 is an enlarged and fragmentary top plan view of  
6 the container showing the latch thereof.

7           Fig. 7 is an enlarged and fragmentary cross-sectional  
8 view of the container showing the latch thereof, taken along  
9 line 7-7 of Fig. 6.

10          Fig. 8 is an enlarged and fragmentary side elevational  
11 view of the container showing the hinge thereof, with  
12 portions broken away to show detail of the hinge.

13          Fig. 9 is a cross-sectional view of the container,  
14 taken along line 9-9 of Fig. 5.

15          Fig. 10 is a top plan view of the container body of the  
16 container with the closure member removed therefrom, showing  
17 a portion of the hinge.

18          Fig. 11 is a fragmentary and enlarged bottom plan view  
19 of the closure member of the container, showing a portion of  
20 the hinge thereof.

21          Fig. 12 is an enlarged and fragmentary side and cross-  
22 sectional elevational view of the container, showing a  
23 portion of the hinge and taken along line 12-12 of Fig. 10.

24          Fig. 13 is an enlarged and fragmentary side and cross-  
25 sectional elevational view of the closure member of the  
26 container, showing a portion of the hinge and taken along  
27 line 13-13 of Fig. 11.

28          Fig. 14 is an enlarged and fragmentary side elevational  
29 view of the container showing the hinge in detail and  
30 showing the closure member in an open configuration thereof.

1           Fig. 15 is an enlarged and fragmentary cross-sectional  
2 side elevation view of the container, showing the hinge and  
3 showing the closure member in a closed configuration  
4 thereof.

5           Fig. 16 is a fragmentary and enlarged front elevational  
6 view of the container showing the latch member in a child  
7 resistant configuration thereof.

8           Fig. 17 is an enlarged and fragmentary front  
9 elevational view of the container, showing the latch in an  
10 easy open configuration and showing the closure member in a  
11 closed configuration thereof.

12           Fig. 18 is an enlarged and fragmentary top plan view of  
13 the container with the latch in the open configuration  
14 thereof.

15           Fig. 19 is a fragmentary and enlarged cross-sectional  
16 view of the container, showing the closure member in a first  
17 open configuration thereof.

18           Fig. 20 is a fragmentary and enlarged cross-sectional  
19 view of the container, showing the closure member in a  
20 second open configuration thereof.

21           Fig. 21 is a fragmentary and enlarged cross-sectional  
22 view of the container, showing the closure member in a third  
23 open configuration thereof.

24           Fig. 22 is a fragmentary cross-sectional view of a  
25 first modified container showing a closure in a first open  
26 configuration thereof.

27           Fig. 23 is a fragmentary cross-sectional view of the  
28 first modified container, showing the closure in a second  
29 open configuration thereof.

30           Fig. 24 is a fragmentary cross-sectional view of the

1 first modified container, showing the closure in a third  
2 open configuration thereof.

3 Fig. 25 is a fragmentary and exploded view of a second  
4 modified container in accordance with the present invention  
5 showing a container body, a closure member that is hingably  
6 connected to the body and a latch member.

7 Fig. 26 is an enlarged and fragmentary cross-sectional  
8 view of the second modified container showing the closure  
9 member in a closed orientation thereof and showing the  
10 closure member in an open orientation thereof in phantom  
11 lines.

12 Fig. 27 is an enlarged and fragmentary cross-sectional  
13 view of the second modified container, taken along line 27-  
14 27 of Fig. 20.

15 Fig. 28 is a side elevational view of a third modified  
16 container in accordance with the present invention,  
17 including a container body, a hinged closure member and a  
18 latch wherein lifting tabs offset from the latch are  
19 provided on the closure member.

20 Fig. 29 is an enlarged and fragmentary top plan view of  
21 the third modified container, showing the latch in an easy  
22 open configuration thereof.

23 Fig. 30 is a fragmentary and enlarged front elevational  
24 view of the third modified container, showing the closure  
25 member thereof in a closed configuration and showing the  
26 latch thereof in a child resistant configuration.

27 Fig. 31 is a fragmentary front elevational view of a  
28 fourth modified container in accordance with the present  
29 invention showing a container body, a closure member, a  
30 latch and a tamper indicating device.

1           Fig. 32 is an enlarged and fragmentary side elevational  
2 view of the fourth modified container with the latch thereof  
3 in a child resistant configuration and with the tamper  
4 indicating device in position, with portions broken away to  
5 show detail thereof.

6

7                     Detailed Description of the Invention

8

9           As required, detailed embodiments of the present  
10 invention are disclosed herein; however, it is to be  
11 understood that the disclosed embodiments are merely  
12 exemplary of the invention, which may be embodied in  
13 various forms. Therefore, specific structural and  
14 functional details disclosed herein are not to be  
15 interpreted as limiting, but merely as a basis for the  
16 claims and as a representative basis for teaching one  
17 skilled in the art to variously employ the present  
18 invention in virtually any appropriately detailed  
19 structure.

20           Figs. 1 through 21 illustrate a first container in  
21 accordance with the present invention, generally designated  
22 by the reference numeral 1. The container 1 includes a  
23 container body 3, a closure member 4, a hinge mechanism 5  
24 rotatably connecting the closure member 4 to the container  
25 body 3 and a latch mechanism 6 for securing the closure  
26 member 4 in a closed configuration to the container body 3.

27           The container body 3 of the illustrated embodiment is a  
28 vial-like structure having a generally cylindrical side wall  
29 10 and a bottom wall 11 secured to the side wall 10. The  
30 side wall 10 is slightly tapered toward the bottom and

1 includes inwardly projecting beads 12 such that multiple  
2 container bodies 3 with the closure members thereof in an  
3 open position can be stacked together and such that the  
4 beads 12 allow the stacked or nested container bodies 3 to  
5 be removed from one another, as the beads 12 function to  
6 prevent a vacuum from being formed between adjacent  
7 container bodies 3.

8       Although a vial-like structure has been shown herein as  
9 the container body 3, it is foreseen that the container body  
10 could be many different structures such as a squeeze tube,  
11 liquid dispensing bottles, including pour and squirt liquid  
12 dispensers, aerosol cans, blow molded bottles and the like.  
13 It is also foreseen under the present invention that the  
14 container body could essentially be only an attachment ring  
15 for mounting on a retention ring of a glass bottle, a  
16 mechanical structure having a lid, such as a copy machine or  
17 the like. In particular, it is foreseen that the present  
18 invention can be utilized with a wide variety of devices  
19 wherein it is advantageous to protect such a device from  
20 being easily opened by children and yet wherein it is  
21 desirable for adults of limited dexterity to be able to open  
22 the device.

23       A first portion 15 of the latch mechanism 6 and a first  
24 portion 16 of the hinge mechanism 5 are fixedly attached to  
25 the container body 3. Likewise, a second portion 17 of the  
26 latch mechanism 6 and a second portion 18 of the hinge  
27 mechanism 5 are attached to the closure member 4.

28       The latch mechanism first portion 15 comprises a  
29 radially outwardly projecting carrier 20 and a tang or  
30 tongue 21 which is connected to the carrier at the lower end

1    thereof by a hinge 22. As used herein, the terms "upper",  
2    "lower", "front", "back" and the like refer to the direction  
3    provided in the description of the drawings and, in  
4    particular, "front" is to the left in Fig. 4. The distal  
5    part of the tongue 21 is thicker or wider than the attached  
6    part thereof. The distal half of the tongue 21 includes a  
7    rectangularly shaped recess 24. The recess 24 opens  
8    radially outward when the latch mechanism 6 is in a hard to  
9    open configuration thereof, such as seen in Fig. 7.

10        The tongue 21 also has a back surface 26 which is  
11    opposite the recess 24 and which is generally planar. The  
12    carrier 20 includes a mating surface 27 which partly abuts  
13    against the tongue back surface 26 when the tongue 21 is in  
14    the hard to open configuration thereof. The mating surface  
15    27 extends from near the tongue hinge 22 to near the lower  
16    edge of the recess 24. As will be discussed later, the  
17    extension of the mating surface 27 is important in  
18    determining how easy or how hard the latch mechanism 6 is to  
19    open. It is noted that unless the hinge 22 is designed to  
20    have limited flexibility, the position of the hinge 32 must  
21    be below the top of the mating surface 27 such that the  
22    tongue 21 will abut against the surface 27 at full extension  
23    of the hinge 22 and provide a backstop for the lower part of  
24    the tongue 21, while the tongue upper or distal end 29 is  
25    being biased backwards.

26        On the most outward side of the recess 24 is a  
27    relatively small elongate channel 28. Also extending from  
28    near the recess 24 to near the distal end 29 of the tongue  
29    is a slanted cam surface 30. It is noted that the tongue 21  
30    has an easy open configuration which is illustrated in Fig.

1     5 wherein the tongue 21 is rotated on the hinge 22 such that  
2     the back surface 26 does not engage the mating surface 27.

3             The tongue 21 is constructed of a relatively resilient  
4     but bendable material if sufficient force is applied  
5     thereto. The tongue 21, when in the hard to open  
6     configuration thereof, is bendable at the upper end thereof  
7     about an upper edge 32 of the mating surface 27.

8             There is a radius or curved surface extending back from  
9     the upper edge 32 about which the tongue 21 bends. The  
10    degree of the radius and the placement of the edge 32  
11    relative to the recess 24 also regulate the degree of  
12    difficulty in opening the latch mechanism 6 when in the hard  
13    to open configuration. In particular, as the edge 32 is  
14    raised and as the degree of radius is lessened, the latch  
15    mechanism 6 becomes harder to open because it is harder than  
16    to bend the tongue distal end 29 rearward so as to clear the  
17    latch mechanism second portion 17 and allow the closure  
18    member 4 to be opened.

19            The lower side of the recess 24 has associated  
20    therewith a bar-like structure 31 that extends across the  
21    front of the tongue. The structure 31 functions as a lower  
22    projection and further limits the ease of opening of the  
23    latch mechanism 6. In particular, the structure 31 prevents  
24    a user from simultaneously pushing inward on the tongue 21  
25    and upward on the latch mechanism second portion 17. It is  
26    foreseen that the structure 31 may be not included if it is  
27    desirable to have an easy open latch of this type, such as  
28    on a lunch box.

29            As seen in Fig. 7, the upper end of the tongue 21 is  
30    bendable or rotatable to the right with the edge 32 acting

1 as a fulcrum for such bending. The mating surface 27  
2 cooperatively prevents a user from depressing the tongue 21  
3 from beneath the recess 24 such that the user must push  
4 against the tongue 21 above the recess 24. As will be noted  
5 below, this requires at least two manual operations to be  
6 applied to open the container 1 in addition to requiring the  
7 container 1 to be held, since a user cannot push upward on  
8 the closure member 4 with the same finger or thumb being  
9 used to depress the tongue 4.

10 The latch mechanism second portion 17 is fixedly  
11 secured to the closure member 4 and extends radially outward  
12 therefrom. The closure member 4 of the illustrated  
13 embodiment comprises a cap or lid 33 having a  
14 circumferential side wall 34 and a top 35. A bottom edge 36  
15 of the wall 34 seats in a corresponding recess 38 in the top  
16 of the container body 3. The recess 38 has an outer wall or  
17 ridge 39 that extends somewhat above the bottom of the  
18 closure member 4 when in the closed configuration thereof so  
19 as to prevent a child from placing his or her teeth under  
20 the closure member 4 and prying it upward. This feature  
21 could also be provided by providing a reverse draft or a  
22 bead and groove mating between the surface of the container  
23 body 3 and closure member 4.

24 The latch mechanism second portion 17 comprises a  
25 wedge or tetrahedral-shaped projection 40 extending  
26 outwardly from the closure member 4. The projection 40 has  
27 an aperture 41 extending from top to bottom therethrough  
28 (when in the closed position) and defining an opening for  
29 receiving the tongue 21. A bar 43 forms the radially  
30 outermost side of the aperture 41 and extends between



1 opposite triangularly shaped sections 44 and 45 of the  
2 projection 40.

3 The aperture 41 is sufficiently wide to receive the  
4 distal end of the tongue 21. In particular, when the  
5 closure member 4 is closed, the cam surface 30 of the tongue  
6 21 defining a tooth-like structure  
7 engages the lower side of the bar 43, thereby pushing the  
8 distal end of the tongue 21 inwardly and bending same  
9 backwards over the mating surface 27 until the recess 24  
10 clears the bar 43. At this time, the distal end of the  
11 tongue 21 resiliently springs forward and the recess 24  
12 snugly receives the bar 43 which is essentially shaped  
13 identical to the recess 24. The bar 43 thereafter  
14 interferingly restricts removal of the tongue 21 from the  
15 aperture 41 and, in particular, prevents the tongue distal  
16 end 29 from passing through the aperture 41 unless the  
17 tongue 21 is bent substantially rearward.

18 In the present embodiment, the bar 43 includes a  
19 radially outward projecting bead 47 which extends past the  
20 tongue 21 and recess 24 thereof. Also in the present  
21 embodiment, the bead 47 provides a fingerhold for a user to  
22 urge the closure member 4 upwardly when the opposite hand of  
23 the user is being utilized to push the upper end of the  
24 tongue 21 backwardly so that the bar 43 is free to clear the  
25 recess 24. In this manner, the closure member 4 can be  
26 opened.

27 The bar 43 also has a centrally located and upwardly  
28 projecting hemisphere or bump 49 thereon which is positioned  
29 so as to interferingly mate with the channel 28 of the  
30 tongue 21 when the tongue 21 is in the hard to close

1 configuration thereof and when the closure member 4 is in  
2 the closed position thereof, such as is shown in Fig. 7 so  
3 as to further interfere with opening of the latch mechanism  
4 6 when in the hard to open configuration thereof.  
5 Consequently, the degree of difficulty in opening the latch  
6 mechanism 6 depends on many features including the placement  
7 of the edge 32, the radius at the top of the surface 27, the  
8 flexibility of the tongue 21, the size and placement of the  
9 bar-like structure 31 and the interference between the  
10 channel 28 and bump 49.

11 It is noted that, although the hinge mechanism first  
12 and second portions 16 and 18 and the latch mechanism first  
13 and second portions 15 and 17 are shown on the container  
14 body 3 and closure member 4 respectively, it is foreseen  
15 that their positions could be reversed.

16 The hinge mechanism first portion 16 includes a pair of  
17 triangularly shaped and outwardly projecting stubs 51 and 52  
18 joined by a bar 53. In the present embodiment, the bar 53  
19 has a circular cross-section and is continuous between the  
20 stubs 51 and 52. However, it is foreseen that the bar could  
21 have other cross-sections including bumps, slots or the like  
22 or that the bar could be formed by discontinuous and spaced  
23 sections such as nipples extending outwardly from the stubs  
24 51 and 52. The bar 53 is positioned close to the top of the  
25 container body 3 and is spaced from the container side wall  
26 10 and aligned such that, if the bar 53 were next to the  
27 container side wall 10 that same would be tangential  
28 thereto. A stub wall 55 projects outwardly from the side  
29 wall 10 toward the bar 53 and in conjunction with the bar 53  
30 and facing sides of the stubs 51 and 52 define an aperture

1 56 therebetween. The aperture 56 is sized so as to  
2 relatively snugly receive a mating portion of the hinge  
3 mechanism 6 as will be discussed below.

4 The hinge member second portion 18 can best be seen in  
5 Figs. 11 and 13. The hinge member second portion 18  
6 comprises a semi-circular sleeve 58 sized and shaped to be  
7 received on and rotate about the bar 53. The sleeve 58 is  
8 preferably resilient and has an inner diameter slightly  
9 smaller than that of the bar 53 such that the sleeve 58  
10 tightly grips the bar 53.

11 The sleeve 58 is supported by a depending wall 59  
12 extending outwardly and downwardly from the rear of the  
13 closure member 4. Extending outwardly from the closure  
14 member 4 on either side of the depending wall 59 are also a  
15 pair of struts 60 and 61 from which also depend a pair of  
16 ears 62 and 63 on the inner sides thereof. Between the  
17 depending wall 59, the semi-circular sleeve 58 and the ears  
18 63 is defined a centrally located and circular channel 64  
19 sized to be received about the bar 53. A pair of apertures  
20 65 on either side of the sleeve 58 are positioned so as to  
21 allow the sleeve 58 to be positioned over the bar 53.

22 In particular, the sleeve 58 is somewhat resilient and  
23 the apertures 65 are readily biased to a more open position  
24 during assembly of this structure such that the bar 53 is  
25 forced between the apertures 65 and into the channel 64. It  
26 is noted that the configuration and geometry of the  
27 structure is such that the bar 53 may be placed in or taken  
28 from the channel 64 only when the closure member 4 is in an  
29 open configuration thereof. When the closure member 4 is in  
30 the closed configuration thereof, the stub wall 55 prevents

1 the sleeve 58 moving in such a manner as to allow the bar 53  
2 from becoming unengaged from the channel 64, thus  
3 effectively preventing any disassembly of the container 1 by  
4 manipulation of the hinge mechanism 5 when the closure  
5 member 4 is in a closed configuration thereof.

6 Shown in Figs. 19 through 21 are various views of the  
7 closure member 4 in different states of opening. It is  
8 noted that the position of the stubs 51 and 52 is such that  
9 the outer and upper edges 66 thereof are positioned so as to  
10 selectively engage the struts 60 and 61 respectively of the  
11 hinge mechanism second portion 18, as can be seen in Fig.  
12 21 (when the closure member 4 is in an open configuration  
13 thereof and at a preselected angle relative to the container  
14 body 3).

15 In particular, the edges 66 engage the struts 60 and 61  
16 in such a manner that it requires exertion of a small degree  
17 of force on the top of the closure member 4 in order to  
18 close the closure member 4 past the position shown in Fig.  
19 21. In this manner, the closure member 4 is held open until  
20 the user desires to close it at which time the user, while  
21 holding the container 1 in one hand, may use a finger of  
22 that hand to push downwardly on the closure member 4 thus  
23 pushing the edge 66 past the struts 60 and 61 for a "snap-  
24 like" closure. It is noted that this operation requires  
25 only the use of a single hand, yet the closure member 4 has  
26 at least one stable open position, as is seen in Fig. 21,  
27 wherein the closure member 4 will retain such position until  
28 urged therefrom by a user.

29 Shown in Figs. 22 through 24 is a first modified  
30 container 70 that is quite similar to the previous

1   embodiment except in the design of the hinge mechanism 71  
2   thereof. In particular, the modified container 70 includes  
3   a container body 73 and a closure member 74 connected by the  
4   hinge mechanism 71. The hinge mechanism 71 is in some ways  
5   similar to the hinge mechanism 5 of the previous embodiment  
6   except that a hexagonal shaped bar 76 extends between  
7   supporting struts 77 that extend from the container body 73.  
8   Likewise, the closure member 74 includes a depending wall 79  
9   with a semi-circular sleeve 80. The interior surface 81 of  
10   the sleeve 80 is also hexagonal in shape and similar in size  
11   and configuration to the bar 76 so as to be snugly received  
12   thereabout. The sleeve 80 is sufficiently resilient so as  
13   to be rotatable about the bar 76 when pressure is applied to  
14   the closure member 74, but when the projections of the bar  
15   76 align with the valleys of the sleeve 80, the sleeve 80  
16   tends to hold that position and, therefore, keep the closure  
17   member 74 in such a fixed position until such time as  
18   pressure is applied again to the closure member 74 by a user  
19   to overcome the resistance to turning thereby provided.

20       Illustrated in Figs. 25, 26 and 27 is a second modified  
21   embodiment of the present invention comprising a container  
22   generally designated by the reference numeral 86. The  
23   container 86 includes a container body 87 having an upper  
24   wall 88 with an aperture 89 therethrough. A closure member  
25   91 is interconnected to the upper wall 88 by a hinge 92. A  
26   latch mechanism 94 is utilized to secure the closure member  
27   91 in a closed configuration.

28       The hinge 92 of the container 86 comprises a flexible  
29   strip 96 attached to the closure member 91 and having a pair  
30   of large headed struts 97 extending therefrom. The struts

1 97 are positioned so as to fit into mating apertures 98  
2 along the upper wall 88 and to lock therein.

3 The latch mechanism 94 includes a resilient member 100  
4 mounted on the upper surface of the upper wall 88 and  
5 extending outwardly therefrom. The resilient member 100  
6 includes a tooth 101 extending outwardly therefrom.  
7 Positioned behind the member 100 is a stub wall 102 with an  
8 upper outer radius forcing the member 100. The wall 102 is  
9 shaped and positioned such that the member 100 must be  
10 braced to bend back over the wall 102 in order for the tooth  
11 101 to clear the front of a tab 103. In particular, the  
12 closure member 91 includes the rectangular tab 103 extending  
13 outwardly therefrom so as to be positioned over the  
14 resilient member 100 when the closure member 91 is in a  
15 closed position thereof. The tab 103 includes an aperture  
16 104 defining a bar 105 at the outermost side thereof. When  
17 in the closed position of the closure member 91, the  
18 resilient member 100 is positioned so that the tooth 101 is  
19 positioned over the bar 105. In order to open the closure  
20 member 91, the resilient member 100 must be biased backward  
21 against an edge 106 of the wall 102 so that the tooth 101  
22 clears the bar 105 while simultaneously pulling upward on  
23 the closure member 91.

24 Shown in Figs. 28 through 30 is a third modified  
25 embodiment of a container according to the present invention  
26 and generally designated by the reference numeral 112. The  
27 container 112 includes a container body 113 and a lid or  
28 closure member 114. The container 112 is similar in many  
29 respects to the container 1 of a previously described  
30 embodiment. Therefore, the major differences between the

1   embodiments will be described in detail rather than  
2   repeating many of the common details therebetween.

3           In particular, the container 112 includes a latch  
4   mechanism 116 and a hinge mechanism 117. The latch  
5   mechanism 116 includes a rotatable tongue or latch member  
6   118 having an easy open position as shown in Fig. 27 and a  
7   hard to open position as shown in Fig. 29. The latch member  
8   118, when in the hard to open position thereof, has a recess  
9   119 which engages a bar 120 mounted upon the closure member  
10   114, as described in the previously described embodiment.

11           Of significant difference between this embodiment and  
12   the first embodiment is that the closure member includes a  
13   shield 122 extending radially outward from near a top  
14   thereof so as to be spaced from but cover the bar 120 and  
15   the latch member 118 when the latch member 118 is in the  
16   hard to open position thereof. The shield 122 functions to  
17   prevent children from using their teeth to bite off the top  
18   of the latch member 118 and thereby adds an extra degree of  
19   child resistance to the container 112. The latch mechanism  
20   116 of the present embodiment also differs from the previous  
21   embodiment in that the bar 120 is effectively flush with the  
22   most radially exterior surface of the latch member 118 when  
23   the latch member 118 is in the hard to open position  
24   thereof. Effectively, this means that the bar 120 is not  
25   accessible to a user to pry the closure member 114 upwardly  
26   when the latch member 118 is pushed back sufficiently far  
27   for the recess 119 to clear the bar 120. Consequently,  
28   shoulders or ears 124 and 125 are provided on the closure  
29   member 114 that allow gripping by the user for prying the  
30   closure member 114 upwardly when the latch member 118 is

1 released from the bar 120.

2 A further modification of the present embodiment over  
3 the first embodiment is in the hinge mechanism 117. The  
4 hinge mechanism 117 of the present embodiment is otherwise  
5 similar to the hinge mechanism of the first embodiment  
6 except that a shield 127 is provided to extend over the  
7 rearward portion of the hinge mechanism 117. The shield 127  
8 provides a smooth exterior surface to a child trying to use  
9 their teeth to damage the hinge mechanism 117 and thereby  
10 open the container 112. This provides a further degree of  
11 child resistance to the container 112.

12 Figs. 31 and 32 illustrate a fourth modified container  
13 of the present invention generally designated by the  
14 reference numeral 130. The container 130 includes a body  
15 131 and a closure member 132 which are connected together by  
16 latch mechanism 133. The container 130 is quite similar to  
17 the container 1 of the first embodiment described except  
18 that tamper indicating means such as tamper guard 134 is  
19 provided.

20 In particular, the latch mechanism includes a resilient  
21 member 135 having an upper tooth 136 which is swingable  
22 between easy open and easy to close positions once the  
23 container 130 is initially open. The closure member 132 has  
24 an outwardly extending bar 137 which is manually received by  
25 a recess 138 of the resilient member 135. The tamper guard  
26 134 is an enclosure which is shaped to fit about the distal  
27 portion of the resilient member 135 and, in particular, the  
28 tooth 136. The tamper guard 134 is frangibly connected to  
29 the closure member 132 such that it may be removed by a user  
30 prior to use of the container 130. Prior to removal of the



1 tamper guard 134, the container 130 cannot be opened as the  
2 tamper guard 134 interferes with the user's ability to push  
3 the tooth 136 backwardly so as to clear the bar 137. Once  
4 the tamper guard 134 is broken away, the tooth 136 can be  
5 pushed by a user so as to clear the bar 137 at which time  
6 the closure member 132 can be raised. It is noted that the  
7 operation of pushing the resilient member 135 and raising  
8 the closure member 132 must be accomplished simultaneously  
9 and normally requires the use of both hands.

10 It is to be understood that while certain forms of the  
11 present invention have been illustrated and described  
12 herein, it is not to be limited to the specific forms or  
13 arrangement of parts described and shown.

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C L A I M S

What is claimed and desired to be secured by Letters Patent is as follows:

1. In a latch mechanism for securing a closure member to a container body including a multipositional latch hinged to a first of the closure member or the container body and allowing a user to select between a hard to open configuration and an easy to open configuration, the improvement comprising wherein:
  - (a) said latch is an elongate tongue hinged at one end thereof to the first of the closure member or the container body and having a rear surface and further having a tooth extending outwardly opposite said rear surface from near a distal end thereof;
  - (b) the first of the closure member or the container body also having positioned thereon a mating surface that abuts against said backing surface when said latch is in the hard to open configuration thereof; said mating surface having an upper edge whereabout said tongue is bent during opening of said latch mechanism; and

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- (c) the second of the closure member or the container body having extending therefrom a bar; said bar being positioned such that, when said latch is in the hard to open configuration thereof, said tooth is resiliently biased over said bar and said mating surface is aligned to abut against said back surface in close proximity to said bar, such that a user, to open the latch, must manually bias the distal end of said latch to bend the latch at the upper edge of the mating surface such that said tooth clears said bar while simultaneously lifting said closure member.

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2. A latch mechanism for securing a closure member to a container body including:
- (a) a latch adapted to be connected to a first of the closure member or the container body and having a closed position and an open position relative to the closure member;
  - (b) said latch comprises an elongate tongue connected near one end thereof to the first of the closure member or the container body and having a rear surface and further having a tooth extending outwardly opposite said rear surface from near a distal end thereof;
  - (c) a bar adapted to be attached to the second of the closure member or the container body and being positioned such that, when said latch is in the closed configuration thereof, said tooth holds said bar and is adapted to prevent the closure member from being opened relative to the container body until said tooth is biased rearwardly relative to said bar and the closure member is simultaneously biased to an open position relative to the container body to urge said bar past said tooth such that said tooth must be biased rearwardly and the closure member simultaneously biased open relative to the container body in order to move from said latch closed position to said latch open position;

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- (d) and further wherein said latch includes means thereon and said bar is configured relative to said latch such that said tooth cannot be depressed rearward and said bar moved from the closed position to the open position simultaneously by use of a single finger; and
- (e) a projection adapted to extend outwardly from the second of the closure member or the container body in substantial circumferentially spaced relationship to said bar; said projection extending sufficiently outward to allow a user to grasp thereunder with a finger, so as to open the closure member relative to said container body when a different finger is depressing said latch tooth rearwardly, whereby at least two fingers are required to be simultaneously used with some dexterity in order to open said latch mechanism.

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3. The latch mechanism according to Claim 2 wherein:
- (a) said latch includes structure means spaced from said tooth and projecting in the same direction as said tooth; said structure means and said tooth relatively snugly receiving said bar therebetween when said latch is in said closed position thereof; said structure means being generally flush with a front of said bar when said latch is in the closed position thereof so as to provide a user no place to grasp said bar opposite said tooth and thereby inhibit a user from using said bar to open the closure member relative to said container body.

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4. In a latch mechanism for securing a closure member to a container body including a multipositional latch hinged to a first of the closure member or the container body and allowing a user to select between a hard to open configuration and an easy to open configuration, the improvement comprising wherein:
- (a) said latch is an elongate tongue hinged at one end thereof to the first of the closure member or the container body and having a rear surface and further having a tooth extending outwardly opposite said rear surface from near a distal end thereof;
  - (b) the first of the closure member or the container body also having positioned thereon a mating surface that abuts against said rear surface when said latch is in the hard to open configuration thereof; said mating surface having an upper edge whereabout said tongue is bent during opening of said latch mechanism; and said upper edge having a curved surface extending inwardly wherein a degree of curvature of said curved surface is directly proportioned to a degree said tongue must be bent during opening of said latch mechanism thereby regulating the difficulty of opening said latch mechanism when said latch is in the hard to open position;

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(c) the second of the closure member or the container body having extending therefrom a bar; said bar being positioned such that, when said latch is in the hard to open configuration thereof, said tooth is resiliently biased over said bar and said mating surface is aligned to abut against said back surface in close proximity to said bar, such that a user, to open the latch mechanism, must manually bias the distal end of said latch to bend the latch at the upper edge of the mating surface such that said tooth clears said bar while simultaneously lifting said closure member.

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5. In a latch mechanism for securing a closure member to a container body including a latch secured at one end thereof to a first of the closure member or the container body; said closure member and said container body being movable relative to each other between an open and a closed configuration, the improvement comprising wherein:

- (a) said latch comprises an elongate tongue having a rear surface and having a tooth extending outwardly opposite said rear surface from near a distal end thereof and further having a ridge extending outwardly opposite said rear surface across said tongue generally parallel to and in a spaced relation to said tooth; and

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- (b) the second of the closure member or the container body having extending therefrom a bar; said bar being positioned such that, when said latch is in the closed configuration thereof, said bar is positioned between said tooth and said ridge such that a user, to open said latch mechanism, must manually bias the distal end of said latch to bend the latch rearwardly relative to said bar such that said tooth clears said bar while simultaneously lifting said closure member relative to said container body; said ridge inhibiting a user from opening the latch mechanism by simultaneously pushing inward on said tongue and upward on said latch mechanism such that the user must push on said tongue near said tooth while simultaneously lifting said closure member at a spaced location from said tooth requiring substantial manual dexterity.

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6. In a latch mechanism for securing a closure member to a container body including a multipositional latch hinged to a first of the closure member or the container body and allowing a user to select between a hard to open configuration and an easy to open configuration, the improvement comprising wherein:
- (a) said latch is an elongate tongue hinged at one end thereof to the first of the closure member or the container body and having a rear surface and having a tooth extending outwardly opposite said rear surface from near a distal end thereof and further having an elongate channel extending from said rear surface to near an innermost edge of said tooth;
  - (b) the first of the closure member or the container body also having positioned thereon a mating surface that abuts against said rear surface when said latch is in the hard to open configuration thereof; said mating surface having an upper edge whereabout said tongue is bent during opening of said latch mechanism; and

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- (c) the second of the closure member or the container body having extending therefrom a bar; said bar having a bead projecting therefrom; said bar being positioned such that, when said closure member is closed relative to said container body and said latch is in the hard to open configuration thereof, said tooth is resiliently biased over said bar and said elongate channel interferingly mates with said projecting bead and said mating surface is aligned to abut against said back surface in close proximity to said bar, such that a user, to open said latch mechanism must manually bias the distal end of said latch to bend the latch at the upper edge of the mating surface such that said bead disengages from said channel and said tooth clears said bar while simultaneously lifting said closure member.

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7. In a latch mechanism for securing a closure member to a container body including a multipositional latch hinged to a first of the closure member or the container body and allowing a user to select between a hard to open configuration and an easy to open configuration, the improvement comprising wherein:

- (a) said latch is an elongate tongue hinged at one end thereof to the first of the closure member or the container body and having a rear surface and further having a tooth extending outwardly opposite said rear surface from a near distal end thereof;
- (b) the first of the closure member or the container body also having positioned thereon a mating surface that abuts against said backing surface when said latch is in the hard to open configuration thereof; said mating surface having an upper edge whereabout said tongue is bent during opening of said latch mechanism;

- (c) the second of the closure member or the container body having extending therefrom a bar; said bar being positioned such that, when said latch is in the hard to open configuration thereof, said tooth is resiliently biased over said bar and said mating surface is aligned to abut against said back surface in close proximity to said bar, such that a user, to open the latch, must manually bias the distal end of said latch to bend the latch at the upper edge of the mating surface such that said tooth clears said bar while simultaneously lifting said closure member; and
- (d) first and second walls extending generally radially outward from the first of said closure member or container body; said first and second walls being positioned on either side of said tongue and in close proximity thereto when the closure member is in a closed position thereof and extending sufficiently outward so that the teeth of a child cannot readily be positioned between said first and second walls to effectively engage said tongue to enable the teeth to pry under said tongue and thereby force said latch mechanism open.

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8. A latch mechanism according to Claim 7 including the container body and the closure member and wherein said container body includes:

- (a) a circumferential ridge extending about a mouth thereof; said ridge being positioned so as to extend over a bottom surface of said closure member when said closure member is in a closed position so as to inhibit a child from grasping said bottom surface to pry said closure member to an open position.

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9. A latch mechanism for securing a closure member to a container body including:
- (a) a latch integrally connected to a first of the closure member or the container body;
  - (b) said latch is an elongate tongue attached at one end thereof to the first of the closure member or the container body and having a rear surface and further having a tooth extending outwardly opposite said rear surface from near a distal end thereof;
  - (c) the first of the closure member or the container body also having positioned thereon a mating surface that abuts against said rear surface during opening of said latch mechanism; said mating surface having an edge whereabout said tongue is bent during opening of said latch mechanism; and

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- (d) the second of the closure member or the container body having extending therefrom a bar; said bar being positioned so that, when said latch mechanism is moved to a closed configuration thereof, said tooth is resiliently biased over said bar and said mating surface is aligned to abut against said back surface in close proximity to said bar, such that a user, to open said latch mechanism, must manually bias the distal end of said latch to bend the latch at the edge of the mating surface such that said tooth clears said bar while simultaneously lifting said closure member.

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10. A hinge for a container having a container body and a closure member, said hinge including:
- (a) a pair of outwardly extending struts mounted on a first of said closure member or container body having a bar-like structure extending therebetween in spaced relation to the first of the closure member or container body so as to form an aperture therebetween;
  - (b) a wall depending from a second of the closure member or container body; said wall having a semi-circular sleeve attached thereto; said sleeve shaped to receive and rotate about said bar-like structure; said sleeve having a thickness being also sized to relatively snugly fit into said aperture, while being rotatable on said bar-like structure; and said sleeve being positioned such that when said closure member is in an open configuration thereof, said sleeve is easily removed from said bar-like structure and when said closure member is in the closed position thereof, said sleeve wraps around said bar-like structure and is positioned to interfere with removal thereof from said apparatus; and

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- (c) an interference projection mounted on the first of said closure member or container body and extending outwardly relative to one of said struts so as to engage the second of said closure member or container body while said closure member is in an open position; said interference projection preventing said closure member swinging due to gravity from at least one open position to the closed position thereof and requiring a user to exert a small degree of force on a top of said closure member in order to place said closure member in the closed position thereof from said open position.

11. A hinge for a container having a container body and a closure member, said hinge including:

- (a) a pair of outwardly extending struts mounted on a first of said closure member or container body having a bar-like structure, polygonal in shape and having projections thereon; said bar-like structure extending therebetween and in spaced relation to the first of the closure member or container body so as to form an aperture therebetween; and

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- (b) a wall depending from a second of said closure member or container body; said wall having a semi-circular sleeve attached thereto; said sleeve having an interior polygonal shaped surface so as to have a series of valleys; said projections being rotatable in said sleeve and each of said projections successively engaging said valleys upon relative rotation thereof; said sleeve shaped to receive said bar-like structure and hold said closure member in a fixed position at each location where said projections align with the valleys of the sleeve polygonal shaped surface; said sleeve being rotatable on said bar-like structure when a user exerts a small degree of force on said closure member; said sleeve having a thickness being also sized to relatively snugly fit into said aperture, while being rotatable on said bar-like structure; and said sleeve being positioned such that when said closure member is in an open configuration thereof, said sleeve is easily removed from said bar-like structure and when said closure member is in the closed position thereof, said sleeve wraps around said bar-like structure and is positioned to interfere with removal thereof from said aperture.

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12. A hinge for a container having a container body and a closure member, said hinge including:

- (a) a pair of outwardly extending struts mounted on a first of said closure member or container body and having a bar-like structure extending therebetween in spaced relation to the first of the closure member or container body so as to form an aperture therebetween;
- (b) a first wall depending from a second of the closure member or container body; said first wall having a semi-circular sleeve attached thereto; said sleeve shaped to receive and rotate about said bar-like structure; said sleeve having a thickness being also sized to relatively snugly fit into said aperture, while being rotatable on said bar-like structure; and said sleeve being positioned such that when said closure member is in an open configuration thereof, said sleeve is easily removed from said bar-like structure and when said closure member is in the closed position thereof, said sleeve wraps around said bar-like structure and is positioned to interfere with removal thereof from said aperture; and

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- (c) second and third walls extending generally radially outward from the first of said closure member or container body; said second and third walls being generally vertically aligned when said closure member is in the closed position thereof and horizontally aligned; said first and second walls positioned on either side of said bar-like structure and in close proximity to said sleeve when the closure member is in the closed position thereof so that the teeth of a child cannot readily be positioned between said second and third walls and said sleeve at such an angle to enable the teeth to pry said sleeve; said second and third walls projecting above said bar-like structure so that the teeth of a child cannot readily be positioned between said sleeve and the first of said closure member or container body.

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13. A hinge for a container as set forth in Claim 12

wherein the container body includes:

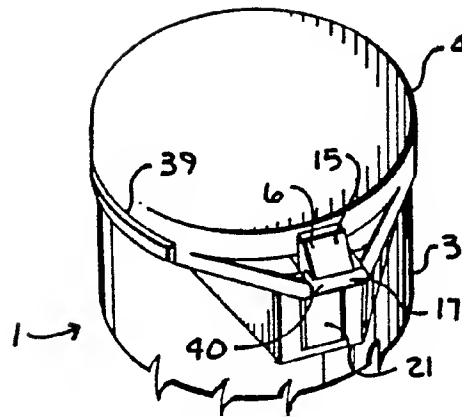
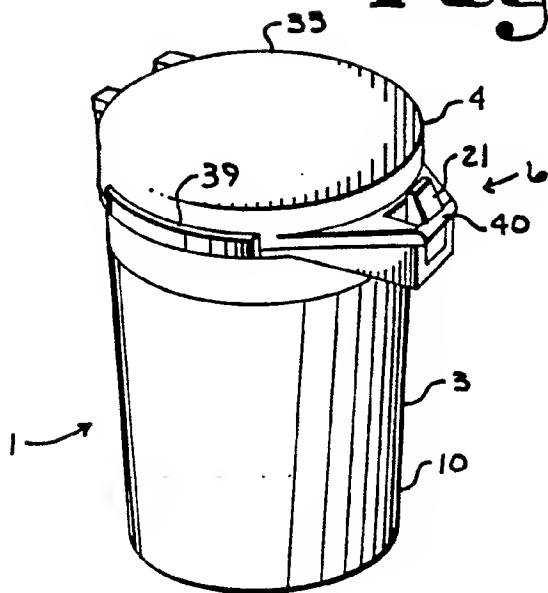
- (a) an outer circumferential ridge extending above the bottom surface of said closure member when said closure member is in the closed position so as to help prevent a child from grasping or biting said bottom surface to pry said closure member open.

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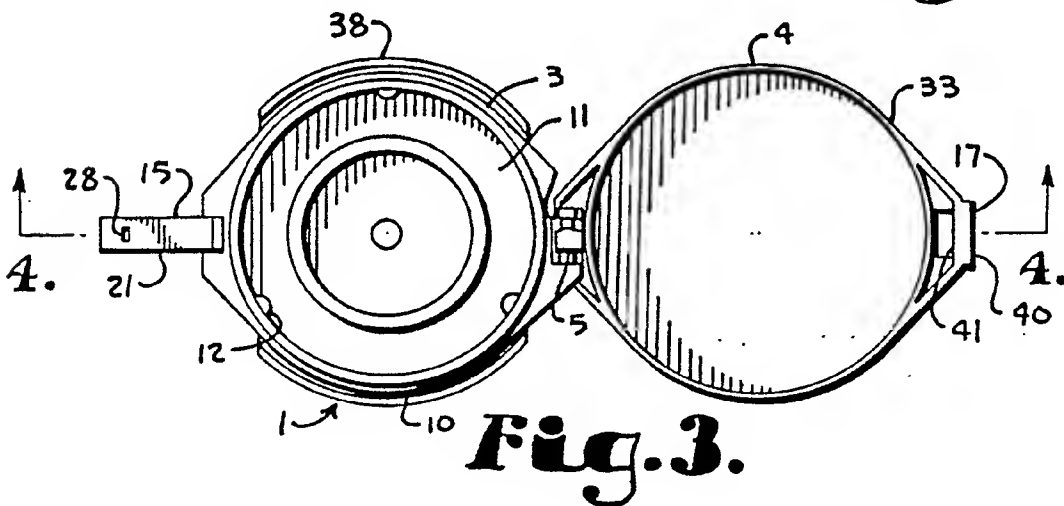


1-6

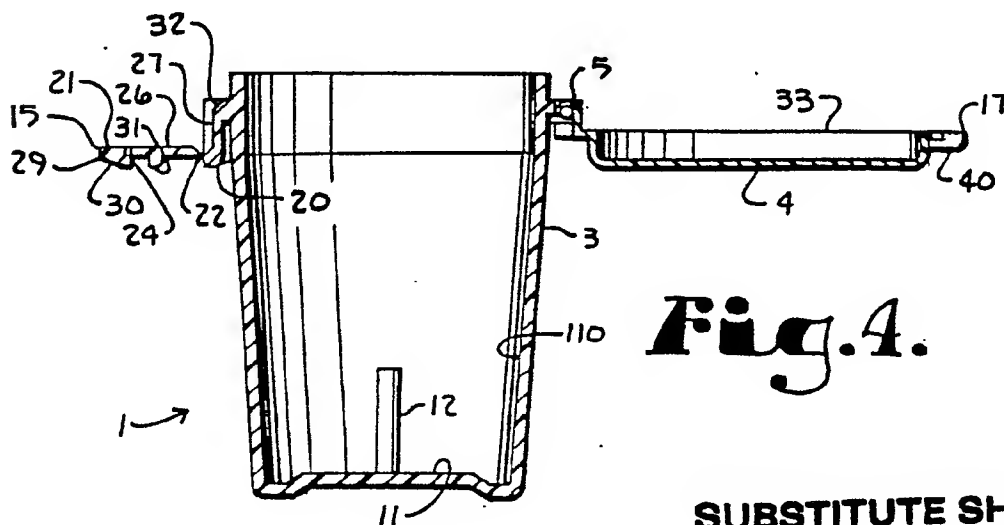
**Fig. 1.**



**Fig. 2.**



**Fig. 3.**

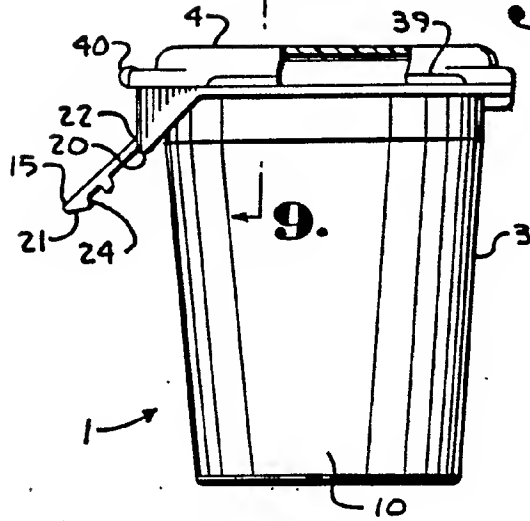


**Fig. 4.**

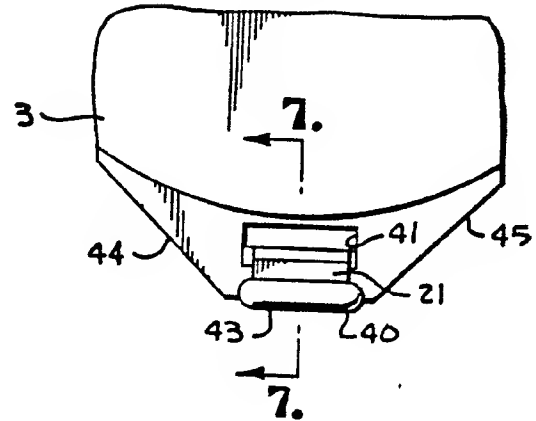
**SUBSTITUTE SHEET**

2-6

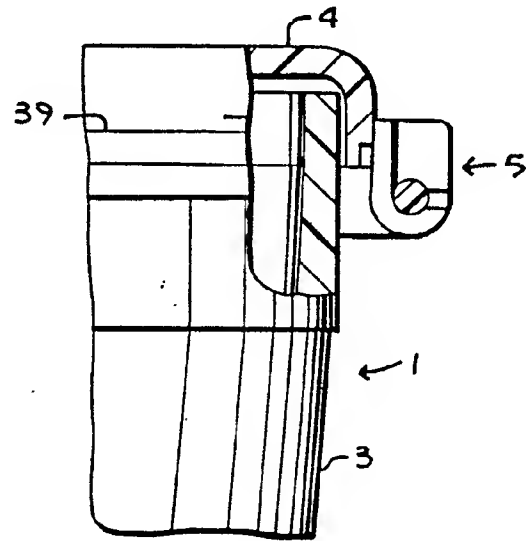
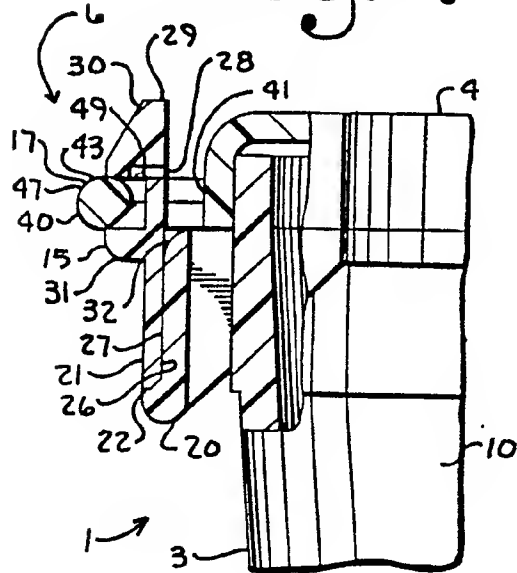
**Fig. 5.**



**Fig. 6.**

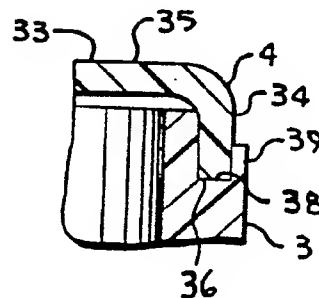


**Fig. 7.**



**Fig. 8.**

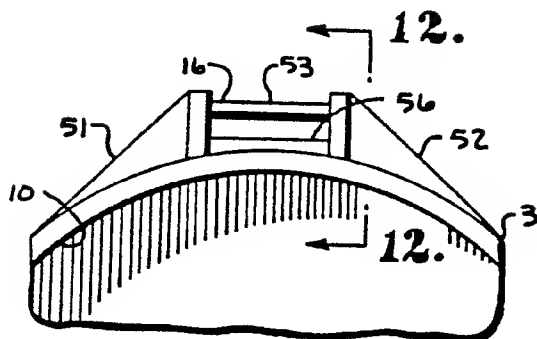
**Fig. 9.**



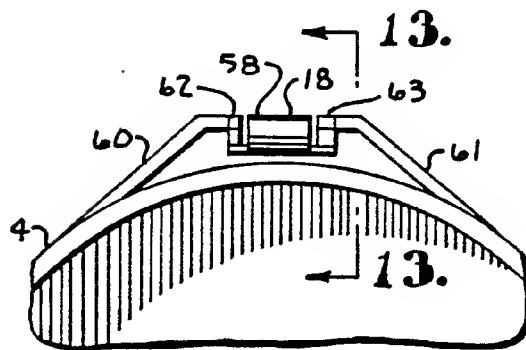
SUBSTITUTE SHEET

3-6

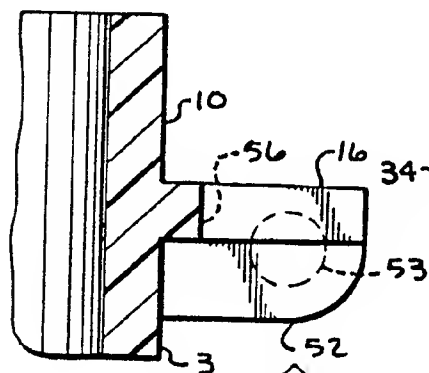
**Fig. 10.**



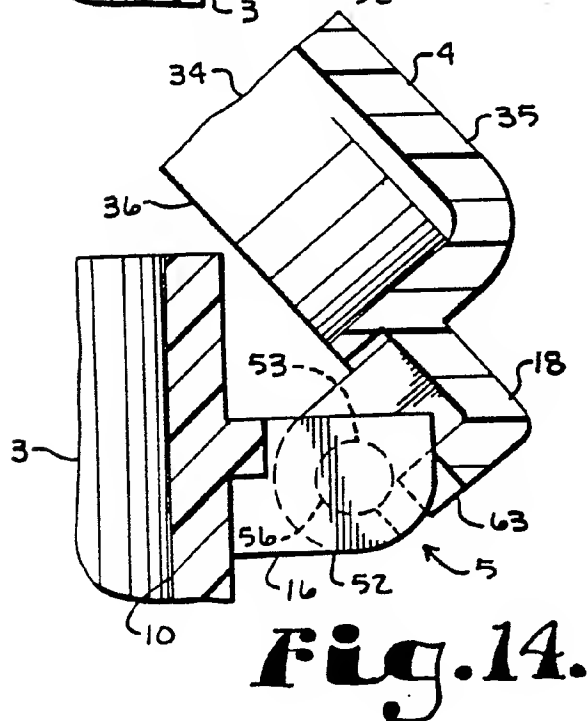
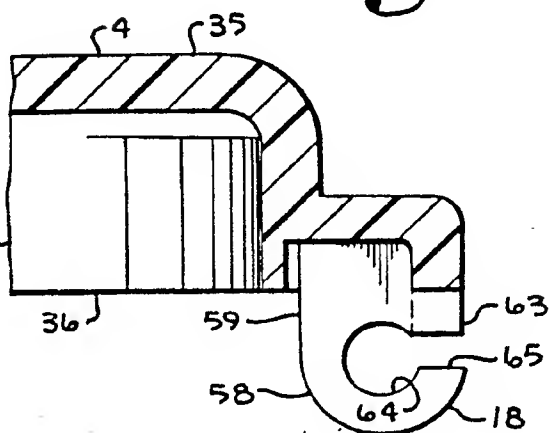
**Fig. 11.**



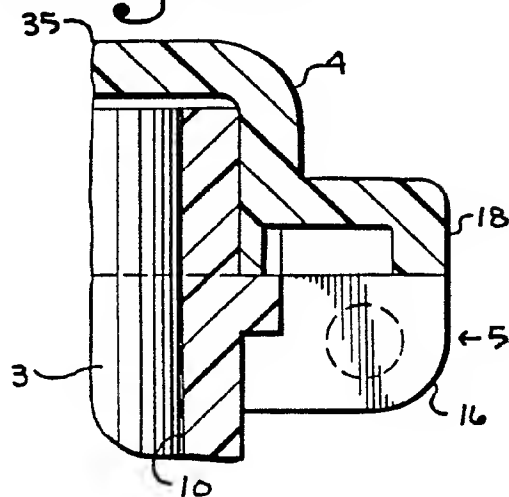
**Fig. 12.**



**Fig. 13.**



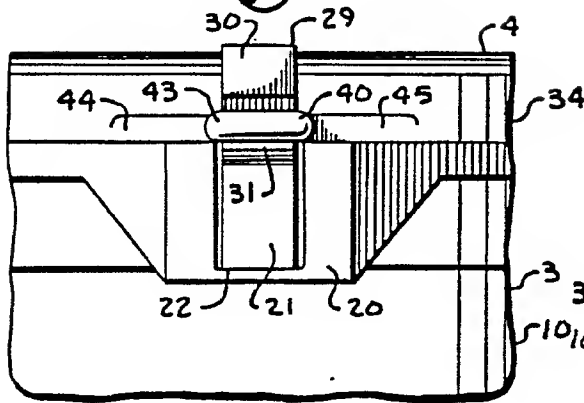
**Fig. 15.**



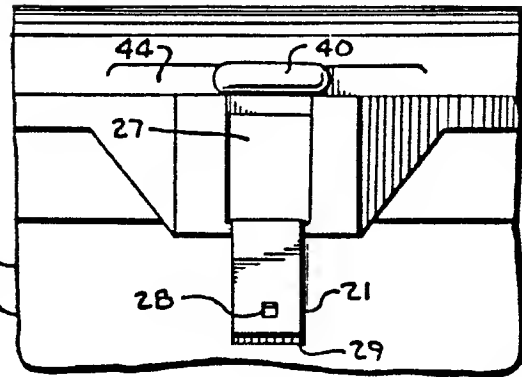
**SUBSTITUTE SHEET**

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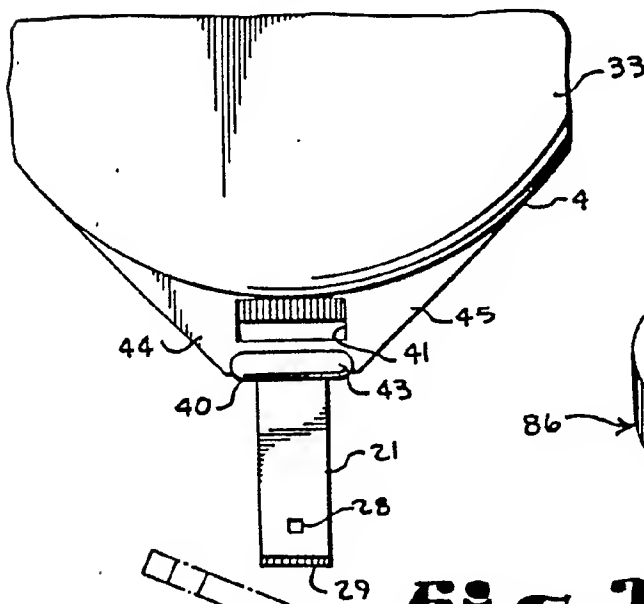
**Fig. 16.**



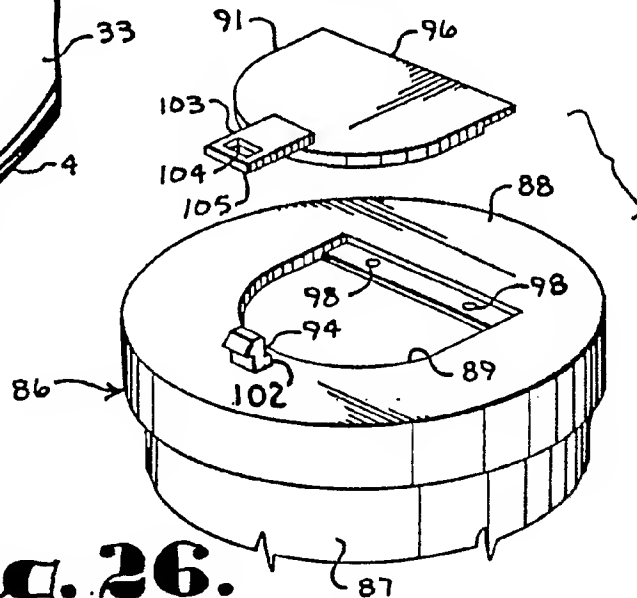
**Fig. 17.**



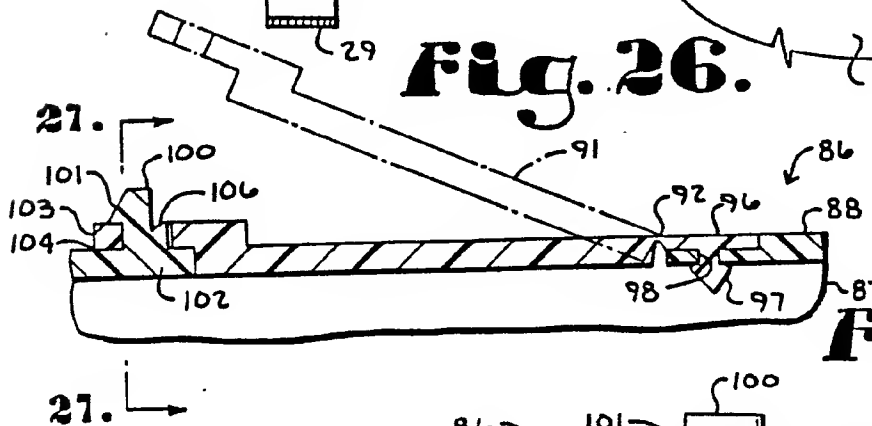
**Fig. 18.**



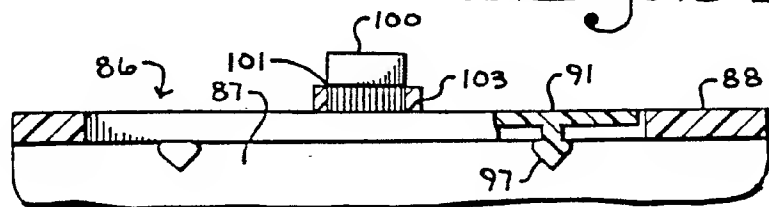
**Fig. 25.**



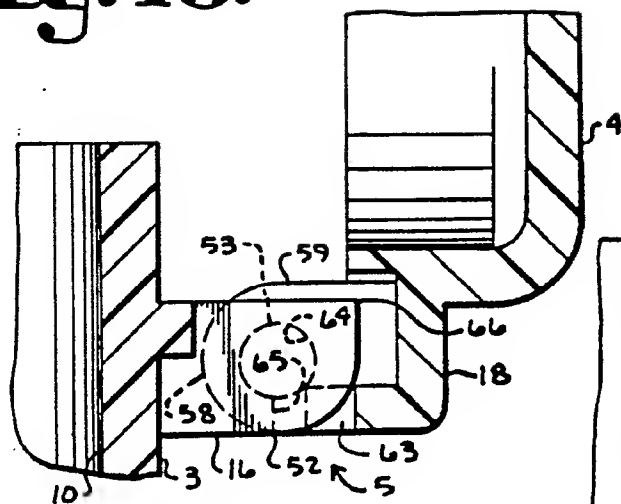
**Fig. 26.**



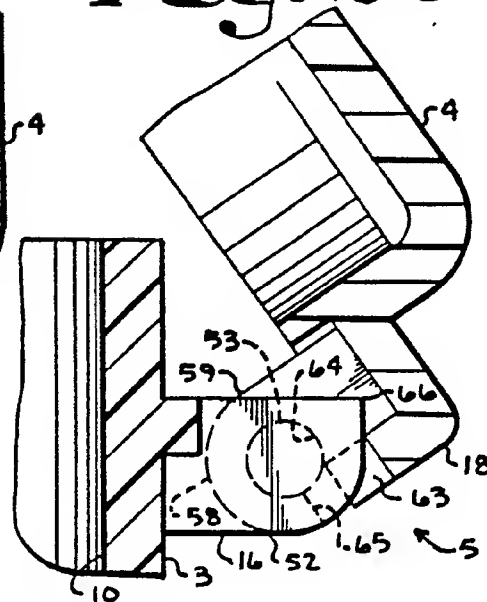
**Fig. 27.**



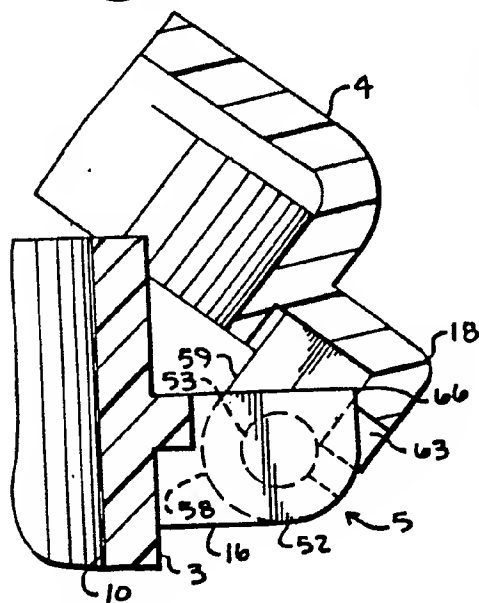
**Fig. 19.**



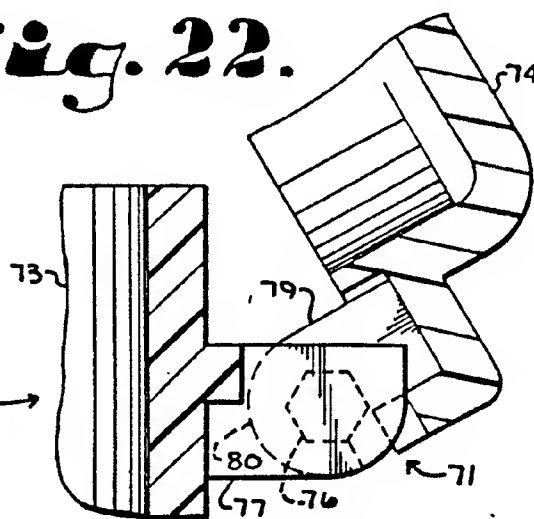
**Fig. 20.**



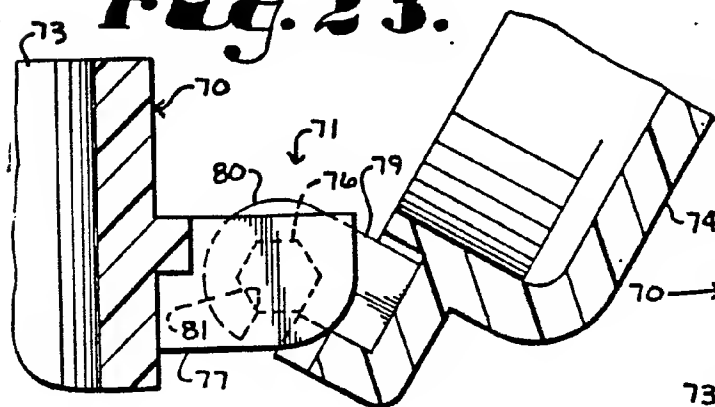
**Fig. 21.**



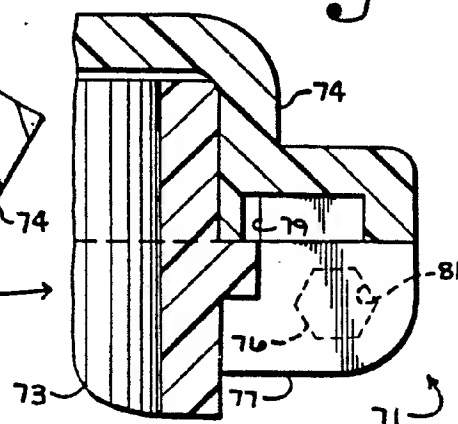
**Fig. 22.**



**Fig. 23.**

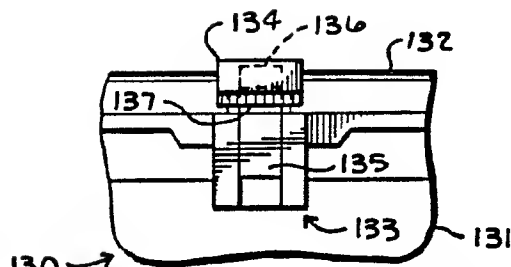
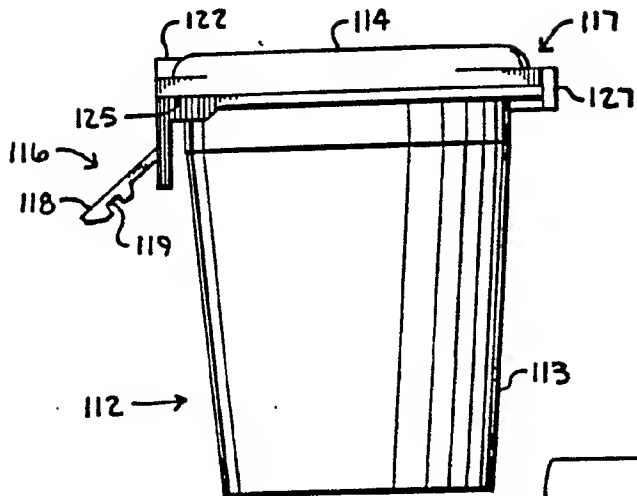


**Fig. 24.**



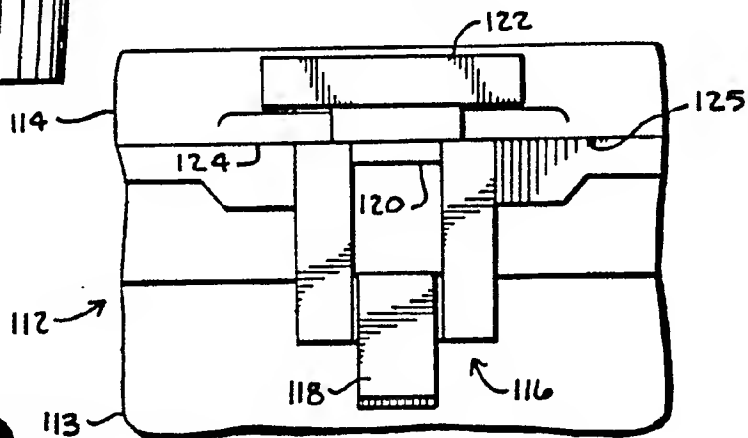
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**Fig. 28.**

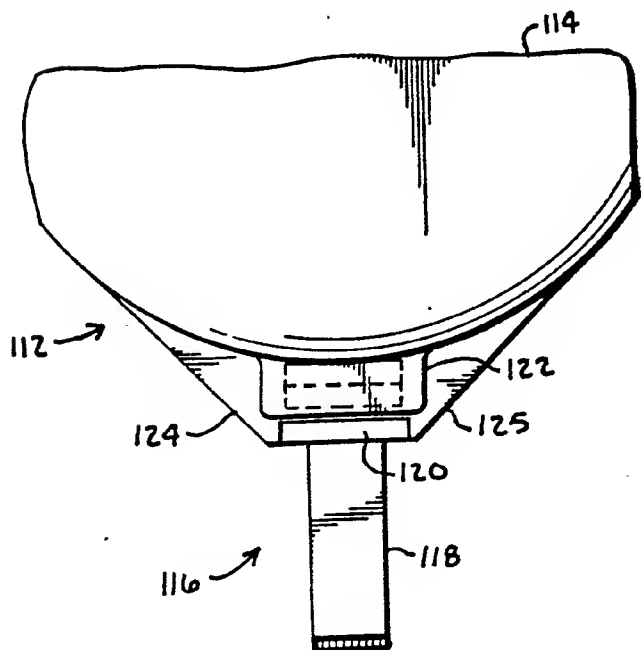


**Fig. 31.**

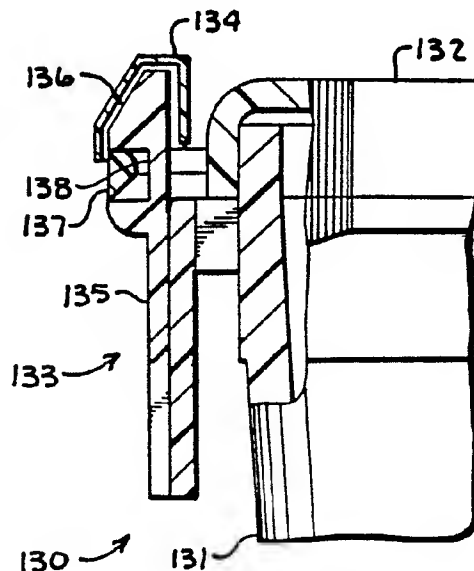
**Fig. 30.**



**Fig. 29.**



**Fig. 32.**



# INTERNATIONAL SEARCH REPORT

International Application No. PCT/US89/00756

<b>I. CLASSIFICATION OF SUBJECT MATTER</b> (it several classification symbols apply, indicate all) <sup>6</sup>		
According to International Patent Classification (IPC) or to both National Classification and IPC		
IPC(4)B65D 43/14, 51/04, 55/02		
<b>II. FIELDS SEARCHED</b>		
Minimum Documentation Searched <sup>7</sup>		
Classification System	Classification Symbols	
US	215/216.235,237,224,316; 220/337,338	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched <sup>8</sup>		
<b>III. DOCUMENTS CONSIDERED TO BE RELEVANT</b> <sup>9</sup>		
Category <sup>*</sup>	Citation of Document, <sup>11</sup> with indication, where appropriate, of the relevant passages <sup>12</sup>	Relevant to Claim No. <sup>13</sup>
A	US, A 2,797,840 (Gibbs) 2 July 1957	
A	US, A 3,023,923 (Geib et al) 6 March 1962	
A	US, A 4,424,910 (Heinol) 10 Jan. 1984	
A	US, A 4,632,266 (Osswald) 30 Dec. 1986	
A	US, A 4,687,112 (Swartzbaugh) 18 August 1987	
<p><sup>*</sup> Special categories of cited documents: <sup>10</sup></p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"&amp;" document member of the same patent family</p>		
<b>IV. CERTIFICATION</b>		
Date of the Actual Completion of the International Search		Date of Mailing of this International Search Report
20 May 1989		05 JUL 1989
International Searching Authority		Signature of Authorized Officer
ISA/US		J. Moy 